

REMARKS

General Comments

Applicants thank the Examiner for acknowledging Applicants' claim for foreign priority and receipt of the certified copy of the priority document. In addition, Applicants thank the Examiner for considering the references listed on the PTO/SB/08 Form submitted with the Information Disclosure Statement of May 26, 2006 and corrected on January 24, 2007. Applicants also thank the Examiner for indicating acceptance of the drawings filed on May 26, 2006.

Statement of Substance of Interview

A personal copy of an Examiner's Interview Summary Record (PTO-413) was given to the Applicants' undersigned representative on March 10, 2008. A personal interview was conducted on March 10, 2008 between the Applicants' undersigned representative and Examiners Xinning Niu and Tod Van Roy. During the personal interview, the Applicants' undersigned representative discussed the differences between the Itaya and Cimini references and independent claim 1. The Examiners agreed that it would be necessary to find a new prior art reference relating to the claimed ratio.

It is respectfully submitted that the instant STATEMENT OF SUBSTANCE OF INTERVIEW complies with the requirements of 37 C.F.R. §§1.2 and 1.133 and MPEP §713.04.

Status of the Application

By the present Amendment, Applicants are amending claims 1, 2, 16, 17, 21, and 23. No new matter is added.

Claims 1-17, 21, and 23 are all the claims currently pending in the application. Claims 1-17, 21, and 23 have been rejected. The present Amendment addresses each point of objection and rejection raised by the Examiner. Favorable reconsideration is respectfully requested.

Claim Objections

The Examiner has objected to claims 16 and 23 for allegedly being of improper dependent form for failing to further limit the subject matter of a previous claim. In order to expedite prosecution, Applicants are rewriting claims 16 and 23 in independent form.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-3, 6, and 17 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over “Low Threshold Current GaInAsP/InP DFB Laser,” IEEE J. Quantum Electron., Vol. QE-23, No. 6, June 1987, pp. 828-834 to Itaya et al. (hereinafter “Itaya”) in view of U.S. Patent No. 5,091,916 to Cimini, Jr. et al. (hereinafter “Cimini”). Claims 4 and 5 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Itaya and Cimini in view of U.S. Patent No. 4,740,987 to McCall, Jr. et al. (hereinafter “McCall”). Claims 7-15 and 21 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Itaya and Cimini in view of U.S. Publication No. 2003/0021319 to Aoki et al. (hereinafter “Aoki”). Claims 16 and 23 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Itaya and Cimini in view of U.S. Patent No. 5,610,930 to Macomber et al. (hereinafter “Macomber”). Applicants respectfully traverse these grounds of rejection.

Claim 1 recites a distributed-feedback (DFB) semiconductor laser comprising, *inter alia*, an active region for generating the gain of a laser beam, and a diffraction grating formed in the active region. Claim 1 also recites that a combination of the coupling coefficient of the

diffraction grating and the length of the active region provides a $\Delta\alpha/g_{th}$ of 1 or more. $\Delta\alpha$ is a gain difference between modes, and g_{th} is a threshold gain.

As the Examiner acknowledges, Itaya does not disclose that a combination of the coupling coefficient of the diffraction grating and the length of the active region provides a $\Delta\alpha/g_{th}$ of 1 or more. However, the Examiner asserts that Cimini discloses this feature at col. 5, lines 9-26, which allegedly teaches increasing the side mode suppression ratio by increasing the gain difference between modes. The Examiner also maintains that it would have been obvious to a person of ordinary skill in the art to modify the DFB laser of Itaya by increasing the side mode suppression ratio and reducing the threshold current, which allegedly results in a $\Delta\alpha/g_{th}$ of 1 or more, in order to produce a DFB laser that requires less power to operate. Applicants respectfully disagree.

Cimini is directed to improving side mode suppression in a distributed Bragg reflector (DBR) laser (col. 2, lines 14-21). A DBR laser has a diffraction grating that acts as an end reflector element for the laser cavity (col. 3, lines 3-5). Cimini improves the side mode suppression of a DBR laser by using a diffraction grating with a strongly asymmetric reflectivity (col. 5, lines 37-41).

The passage of Cimini cited by the Examiner (col. 5, lines 9-26) describes the graph of Fig. 2, which shows the net threshold gain 200 as a function of relative frequency for a standard DBR laser (col. 4, lines 65-68). Points 210-240 illustrate the approximate motion of two adjacent modes of the laser when the diffraction grating is being tuned (col. 5, lines 9-12). Fig. 5 shows a similar graph for a DBR laser that incorporates the diffraction grating with a strongly

asymmetric reflectivity, in accordance with the invention disclosed in Cimini (col. 5, lines 60-67).

However, neither Fig. 2 nor Fig. 5 discloses a $\Delta\alpha/g_{th}$ of 1 or more, where $\Delta\alpha$ is a gain difference between modes and g_{th} is a threshold gain, as recited in claim 1. Although these figures illustrate the difference in net threshold gain between a main mode and a side mode, they do not disclose a ratio of the gain difference between modes and the threshold gain, as recited in claim 1. Even if these figures could be read to disclose a gain difference between modes of approximately 0.3 (the greatest difference between the main mode and the side mode, as illustrated by the circular data points 210 and 220 in Fig. 2) and a threshold gain of approximately 0.75 (the average value of the net threshold gain of the data points in Fig. 2), the ratio of the gain difference and the threshold gain would be 0.4, which is less than 1. Claim 1 recites that the ratio of the gain difference and the threshold gain is 1 or more.

Therefore, Applicants submit that neither Itaya nor Cimini discloses a $\Delta\alpha/g_{th}$ of 1 or more, as recited in claim 1. Further, it would not have been obvious to a person of ordinary skill in the art to modify Itaya to incorporate the teachings of Cimini. Itaya is directed to a DFB laser, whereas Cimini is directed to a DBR laser. As a person of ordinary skill in the art understands, a DFB laser has a diffraction grating formed within the active region (see specification, ¶ [0017]). In contrast, a DBR laser has a diffraction grating formed outside of the active region (see Cimini, col. 2, lines 3-5; col. 6, line 64 - col. 7, line 10). Therefore, a DFB laser and a DBR laser have different structures and principles of operation, and it would not have been obvious to modify the DFB laser of Itaya to incorporate the features of the DBR laser of Cimini.

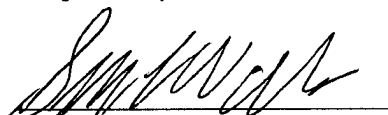
Accordingly, Applicants submit that claim 1 is patentable over Itaya and Cimini. Claims 2, 6, and 17 are patentable over Itaya and Cimini at least by virtue of their dependencies on claim 1, as well as their additionally recited features. Further, Applicants submit that McCall, Aoki, and Macomber each fail to remedy the deficiencies of Itaya and Cimini. Therefore, claims 4, 5, 7-16, 21, and 23 are patentable over Itaya, Cimini, McCall, Aoki, and Macomber for at least the reasons discussed above, as well as their additionally recited features.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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